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ABSTRACT

In this document, detailed objectives for the following courses are listed: Algebra I, Algebra II, Geometry, Trigonometry, Analytic Geometry, Advanced Mathematics, Personal Business Mathematics, and Business Mathematics. Each objective is keyed to an expected level of achievement: awareness, knowledge, application, mastery, reinforcement, and enrichment. Also contained herein is an overview of the basic mathematics program at Northern Lehigh School District. (MP)

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SPECIALIZED MATHEMATICS COURSES

Secondary Level

Learning Objectives

Scope and Sequence

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SE 025 257

SPECIALIZED MATHEMATICS COURSES

Secondary Level

Learning Objectives

Scope and Sequence

During the spring of 1977, the task of revising and coordinating the mathematics program for the Northern Lehigh School District was undertaken by a mathematics curriculum committee. This project is but one step in the school district's plan for complete curriculum re-organization and updating. From May 1977 through July 1978 various workshops, meetings, validations, revisions, and additions were accomplished.

This mathematics program provides realistic goals for all students K-12, along with the flexibility to meet the special needs of individual youngsters. The program is based on competencies that should be developed by each student, and is presented in three documents: Basic Mathematics, K-12; Specialized Mathematics, secondary level; Competency Testing Manual.

Northern Lehigh School District
Slatington, PA 18080

SPECIALIZED MATHEMATICS COURSES

Secondary Level

Algebra I

Algebra II

Geometry

Trigonometry

Analytic Geometry

Advanced Mathematics

Personal Business Mathematics

Business Mathematics

NORTHERN LEHIGH SCHOOL DISTRICT
Slatington, Pennsylvania

Northern Lehigh School District

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Assistant Principal: Slatington High School	Mr. Lynn J. Solt
Principal: Slatington Junior High School	Dr. James A. Shafer, Jr.
Principal: Slatington Elementary School	Mr. Gerald Zinner

MATHEMATICS CURRICULUM COMMITTEE

DIRECTOR:	Mr. Gerald Zinner Principal - Slatington Elementary School
MEMBERS:	Miss Martha Best Head Teacher - Walnutport Elementary School
	Miss Leslie Campbell Teacher - Slatington Elementary School
	Mr. Robert Mack Teacher - Slatington High School
	Mr. Dalton Semmel Teacher - Slatington Junior High School
	Miss Carol Smith Head Teacher - Slatedale Elementary School
	Mrs. Doris Smith Department Coordinator, 7-12 Slatington High School
CONSULTANTS:	Mr. William J. Albright Program Specialist Carbon-Lehigh Intermediate Unit
	Dr. William W. Oswalt Assistant Director Carbon-Lehigh Intermediate Unit

NORTHERN LEHIGH SCHOOL DISTRICT

DISTRICT PHILOSOPHY

The Northern Lehigh School District believes that knowledge, mental and motor skills, creative self-expression, problem-solving capabilities, a desire for learning, and self-respect are necessities for the development of social awareness, moral sensibility, and civic responsibility.

The Northern Lehigh School District believes that many agencies (the family unit, church, and other community organizations) must interact to promote positive affective development.

The Northern Lehigh School District shall provide instruction in general knowledge, in mental and motor skills, and in problem-solving techniques. The needs and interests of students will be considered within the limits of available resources. We believe that the development of positive self-concept can be influenced through instruction in general knowledge, training in muscular coordination and mental processes, and provision of a variety of other influential experiences emphasizing character, morals, and civic responsibility.

DISTRICT WIDE GOALS

PREAMBLE:

"Man's reach must exceed his grasp." Goals must be set high enough to make them difficult, if not impossible, to reach. We must place our emphasis on the continual attempt to move toward the target. Such is the nature of working with goals.

Any set of worthwhile educational goals can only be implemented through the cooperation and sustained commitment of all segments of a community. These are the proposed goals of the schools of Northern Lehigh. Assistance, cooperation, and/or support from any and all of the people of the Northern Lehigh School District is essential for attainment of these goals.

The Northern Lehigh School District commits itself to the following goals:

I. To insure that students reach an expected and measured level of proficiency in factual knowledge, cognitive learning, and mental and motor skills.

The students shall:

A. Receive a broad general background of knowledge and develop skills.

B. Reach their physical and intellectual capabilities.

C. Apply knowledge and skills to solve problems relevant to the individual, the school, and community.

D. Achieve a working knowledge of our language and the ability to communicate in both oral and written expression.

E. Acquire a working knowledge of mathematical concepts and the ability to compute and solve problems.

F. Learn to reason and use this logical thinking to distinguish fact from opinion.

G. Gain a working knowledge and understanding of basic scientific principles.

H. Gain a working knowledge of the social sciences.

I. Acquire knowledge and understanding of their physical make-up and learn proper care.

J. Learn about life careers and opportunities and receive appropriate vocational training.

K. Acquire knowledge and skills to cultivate an interest in a wide variety of activities for wise use of leisure time.

II. To promote in students the affective learning needed to develop social awareness, moral sensibility, and civic responsibility.

The students shall:

A. Learn to accept responsibility and to respect the rights of others.

B. Develop a positive attitude toward self, school, and community.

C. Learn through interaction with teachers and community.

D. Prepare for responsible adulthood and parenthood.

E. Develop the curiosity and interest in learning needed to adjust to a changing world.

III. To develop in students an attitude of appreciation and active concern for the world around them, their own cultural heritage, and the cultural heritage of others.

The students shall:

A. Acquire knowledge of and appreciation for their environment.

B. Achieve a working knowledge and understanding of their heritage and government.

C. Gain a knowledge and understanding of cultures other than their own.

D. Accept a commitment to making a better world.

IV. To foster in students a positive self-image, both physically and mentally.

The district shall:

A. Meet the individual needs and interests of the students whenever possible and instruct them on their own level of ability.

B. Encourage students to test the limits of their physical and mental abilities.

C. Use positive reinforcement.

D. Set realistic goals and develop self-image through success.

E. Encourage humanization of teacher-student relationship.

F. Promote emotional stability through proper use of student's abilities and disabilities.

G. Encourage self-expression and creativity.

H. Cultivate affective skills for self-understanding.

I. Promote the theory that the school exists for the child.

V. To promote and foster the cultural and social growth of the community through the sharing of intellectual wealth and human and physical resources.

The district shall:

A. Encourage involvement in and appreciation of aesthetic areas.

B. Encourage community participation in planning and revising educational programs and facilities.

C. Encourage community interests and participation in the learning process and community-wide use of facilities.

INTRODUCTION

The adoption of a district philosophy and goals in 1976 led to a commitment to examine and reorganize our curriculum to best realize these goals. The codification of curriculum will provide teachers with the tools to best educate our students.

The Mathematics Committee was formed with representation from elementary (3), junior high (1), and senior high (2) and placed under the direction of the Slatington Elementary School principal. Working in consultation with two intermediate unit advisors, the committee worked over a period of two years on the project.

The committee set as its first goal the identification of competencies which would be expected of all graduates. To achieve these competencies a basic mathematics program was designed, which indicates learning objectives with expected levels of achievement for each grade. In addition, specialized courses were developed, using the same format, to provide a complete mathematics program for students of all abilities.

A testing program to monitor basic mathematics skills development was designed. Tests will be administered at grades three, six, nine, and eleven or twelve. The tests in grades three, six, and nine will check on students' progress in skill development and provide teachers with a diagnosis of areas in need of further attention. The test which is administered in grade eleven or twelve will assess the students' mastery of the competencies which are expected of all graduates. The competencies include skills and information used in practical applications which relate to the students' functioning in real life situations.

In the course outlines learning objectives are keyed to expected levels of achievement. The achievement levels are:

Abbreviation		
Aw	AWARENESS:	Students becomes conscious of concept by exposure and having attention drawn to it.
K	KNOWLEDGE:	Student can recall/define/identify concept after direct teaching/learning experiences.
Ap	APPLICATION:	Student uses concept to accomplish tasks appropriate to functional level.
M	MASTERY:	Student independently applies concept to accomplish tasks with increasing efficiency.
R	REINFORCEMENT:	Student maintains and broadens mastery through application of concept to accomplish tasks for greater sophistication.
(E)	ENRICHMENT:	Suitable objective for students of superior ability.

Objectives within each grade level are organized in strands--

In grades K-6 the strands are:

Numeration, Addition, Subtraction, Multiplication, Division, Fractions, Money, Time, Measurement, Geometry

In grades 7-9 the strands are:

Numeration, Basic Operations (addition, subtraction, multiplication, division), Fractions, Money, Time, Measurement, Geometry

Within each strand, K-9, skills are listed sequentially.

The program in the upper grades is organized into specialized courses: Algebra I, Algebra II, Geometry, Trigonometry, Analytic Geometry, Advanced Mathematics, Business Mathematics, and Personal Business Mathematics.

Despite the listing of objectives by grade, the individual ability of each pupil will determine levels of performance; thus, a given student may be functioning on grade level in some areas but may need more basic training in others. Likewise, individuals may be advanced beyond stated expectations. An enrichment strand is provided for students with special abilities. The teacher should determine where each child is in terms of a given objective and teach from that point.

The Basic Mathematics Program is designed to lead to competencies for each student. The basic operations applied to a practical situation will be the measure to determine how proficient each student becomes in using mathematics for life. Provisions should be made for all students to receive instruction in the practical application area.

MATHEMATICS PHILOSOPHY

Proficiency in fundamental arithmetical skills, understanding of mathematical concepts, and their practical applications represent life skills whick students need to function in our society. The need to develop these competencies requires a structured program which presents the skills, concepts, and applications in anappropriate scope and logical sequence.

Maintaining a sequence is absolutely essential in the development of arithmetical skills. Insturction should follow the sequence, insuring proficiency at each level, in order to assure successful learning. Conceptual development is enhanced when teaching strategies proceed from the concrete, to the pictorial, to the symbolic. All areas of mathematics are more easily grasped when there are practical daily applications in problem solving.

Mathematics, like all systems which use symbols, is a language for communicating information and ideas. Through numbers, terms, operations, and concepts, mathematics attempts to convey a message in concise form. Because of these characteristics, it is essential that basic mathematics be mastered by everyone. In addition to and beyond the basic mathematics program special needs related to higher ability levels, career preparation, and foundations for higher education will be met through specialized courses.

MATHEMATICS K-12
GENERAL COMPETENCIES FOR THE GRADUATE

Each student will demonstrate a grasp of fundamental mathematical skills. The student will be able to use these skills in practical applications.

Fundamental Mathematical Skills and Information

The student will:

- -Demonstrate an understanding of our system of numeration.
- -Use and apply the techniques of addition, subtraction, multiplication, and division of rational numbers.
- -Understand and use basic mathematical terminology.
- -Perform simple computations and estimations mentally.
- -Have a basic knowledge of measurement systems and the ability to measure.
- -Discriminate basic geometric shapes.
- -Demonstrate the ability to use money.
- -Demonstrate an understanding of our time system, its notations, and the ability to tell time.
- -Demonstrate the ability to collect, compile, and interpret numerical data.

PRACTICAL APPLICATION

The student will:

- -Apply his knowledge of our monetary system in effective personal and/or business economic management.
- -Apply his knowledge of our time system in his personal and occupational life.
- -Apply his knowledge of both metric and English measurement systems and use measurement devices accurately.
- -Read tables and graphs.

BASIC MATHEMATICS PROGRAM

OVERVIEW

GRADE	NUMERATION	BASIC OPERATIONS (Addition, Subtraction, Multiplication, Division)
K	Works with sets (groups), number values 0-10, similarities and differences.	Deals with concept of "add to" and "take away" using objects.
1	Uses numbers to 99; recognizes ordinals; counts by 2's, 5's, 10's; deals with symbols and place value.	Combines sets and objects; uses computational patterns and symbols for addition and subtraction; add up to sum of 19; subtracts with differences less than 20.
2	Uses numbers to 500, reads numbers to 999; recognizes terms for place value; applies expanded notation.	Adds and subtracts with regrouping tens to ones including up to two digit numbers; recognizes use of associative and commutative properties and use of zero; recognizes symbols for multiplication; uses multiplication tables 1-5; recognizes identity property of one.
3	Uses numbers to 9,999; learns Roman numerals up to twelve; recognizes the concept of odd and even numbers.	Adds and subtracts up to three digit numbers with regrouping; estimates answers; adds series of one digit numbers in columns form; uses multiplication tables up to ten; multiplies up to three digits by one digit numbers with regrouping; uses forms and notation for division; divides up to three digit by one digit numbers with remainders.

BASIC MATHEMATICS PROGRAM

OVERVIEW

MONEY and TIME	MEASUREMENT and GEOMETRY	FRACTIONS
Learns coins and simple vocabulary for time relationships.	Recognizes size, shapes, direction, and relationships.	
Recognizes coins; assigns appropriate values and combines them to make change; recognizes labels for days, months, seasons, and appropriate numbers of each; identifies terms for time and tells time to the half-hour.	Develops concept of linear and liquid measurement, mass/weight, and temperature using both the English and metric systems; recognizes and reproduces basic geometrical shapes.	Divides part of whole; recognizes simple terms and associates them with figures.
Associates equivalent values of money and makes change up to 25 cents; sequences days, months, seasons; reads a calendar; tells time to five minute intervals; reads and writes notation for time; recognizes varying terms for equivalent terms.	Recognizes specific units of linear and liquid measurement, mass/weight, and temperature involving the English and metric systems; uses perimeter and area; recognizes additional geometrical shapes; identifies shapes of varying sizes.	Recognizes, reads, and writes terms and symbols; associates parts of visual shapes and sets; equates fractions to the whole.
Associates equivalent values of money and makes change up to ten dollars; recognizes terms and notation for money; adds and subtracts up to ten dollars; multiplies money by one digit; identifies equivalent parts of time to minutes in an hour; tells time to one minute intervals; solves computational problems using time.	Continues development of units of measurement; works conversion problems within each system; recognizes various symbols of measurement units; expands recognition and use of geometry to include rays, angles, curved and straight lines.	Divides shapes and sets into fractional parts; recognizes terms and symbols beyond one fractional part; adds fractions of like denominator.

BASIC MATHEMATICS PROGRAM

OVERVIEW

GRADE	NUMERATION	BASIC OPERATIONS (Add., Sub., Mul., Div.)
4	Uses numbers to 1,000,000; reads Roman numerals up to 500; rounds off numbers.	Adds up to six digit numbers and checks; groups by ten in column addition; subtracts up to four digit numbers and checks; recognizes terms for parts of addition, subtraction, multiplication and division; multiplies up to three digit by two digit numbers and checks; recognizes uses of zero in division.
5	Recognizes numbers beyond 1,000,000; reads Roman numerals up to 1,000; uses powers of ten; deals with prime and composite numbers; is aware of other number bases.	Reinforces addition and subtraction of whole numbers; multiplies up to three digit by three digit numbers and by multiples of 1,000; recognizes the use of the distributive property in multiplication; divides up to five digit by two digit numbers expressing remainders as fractional parts; divides by multiples of 10.
6	Uses prime factors and greatest common factor; is aware of prime numbers up to 500.	Reinforces addition, subtraction, multiplication, and division of whole numbers; multiplies by multiples of 1,000; uses short division with one digit divisors; divides by multiples of 100; uses rules of divisibility for two and five.

BASIC MATHEMATICS PROGRAM

OVERVIEW

MONEY and TIME	MEASUREMENT and GEOMETRY	FRACTIONS
Adds and subtracts money up to 100 dollars; multiplies money up to three digits by one digit; identifies equivalent parts of time to seconds in a minute; reinforces computational problems using time.	Solves computational problems involving linear and liquid measurement and temperature; uses concept of estimation in measurement; recognizes quadrilaterals; uses term length, width, diameter, area, and perimeter; recognizes graphing terms; reads and interprets graphs.	Identifies numerator and denominator; subtracts fractions of like denominator; uses terms and concepts of proper, improper, and mixed numbers and solves problems with them; converts improper fractions to mixed numbers, recognizes zero value in fractions.
Adds and subtracts money and solves two-step problems with combining money and making change; multiplies money up to three digits by two digits; divides money by one and two digit divisors; develops concept of standard and daylight savings time; reinforces computational problems using time.	Develops concept of metric prefixes; recognizes use of abbreviations in English and metric systems; reinforces computational problems in measurement; recognizes polygons; uses compass and protractor; recognizes and reads various types of graphs.	Converts proper fractions into lowest terms; adds and subtracts fractions with unlike denominators; multiplies and divides fractions; uses concept of decimals; adds and subtracts decimals; multiplies decimals by whole numbers.
Adds, subtracts, and multiplies money; divides money by two digit divisors; reinforces computational problems using time.	Reinforces computational problems involving measurement and the use of measuring devices; recognizes different types of angles and lines; reproduces simple bar and line graphs; reads tables.	Adds, subtracts, multiplies and divides various combinations of fractions, mixed and whole numbers; recognizes decimals up to thousandths; adds, subtracts, multiplies, and divides various combinations of decimals and whole numbers; develops concept of percent and converts fractions and decimals to percent.

BASIC MATHEMATICS PROGRAM

OVERVIEW

GRADE	NUMERATION	BASIC OPERATIONS (Add., Sub., Mul., Div.)
7	Uses least common multiple; reinforces previous numeration concepts and skills.	Reinforces addition, subtraction, multiplication, and division of whole numbers; multiplies by multiples of 1,000; uses short division with one digit divisor; divides by multiples of 100; uses rules of divisibility for two and five.
8	Recognizes integers; reinforces all previous numeration concepts and skills.	Reinforces addition, subtraction, multiplication, and division of whole numbers and all operations.
9	Develops use of absolute value and negative numbers; uses roots of numbers; reinforces previous numeration concepts and skills.	Reinforces addition, subtraction, multiplication, and division of whole numbers and all rules, terms, and operations; uses mental computations; uses four operations with integers.

BASIC MATHEMATICS PROGRAM

OVERVIEW

MONEY and TIME	MEASUREMENT and GEOMETRY	FRACTIONS
Applies basic operations with money involving finding interest, sales problems, marketing problems, and finding commission; reinforces computational problems using time.	Reinforces computational problems involving measurement and the use of measuring devices; converts Celsius to Fahrenheit system and vice-versa; continues development of angles; reproduces and constructs picture, bar, and line graphs; reads circle graphs.	Reinforces all concepts and basic operations with fractions and decimals; recognizes ratio and proportion; recognizes formula for finding percentage and uses proportion in percentage.
Reinforces basic operations with money including use of checking accounts; reinforces computational problems using time.	Reinforces computational problems involving measurement and the use of measuring devices; calculates circumference of a circle and volume of various objects; plots points on a coordinate plane; reads road maps.	Reinforces all concepts and basic operations with fractions, decimals, and percentage.
Reinforces basic operations with money; reinforces computational problems using time.	Reinforces computational problems involving measurement and the use of measuring devices; reinforces the use of various geometrical shapes, concepts, and operations.	Reinforces all concepts and basic operations with fractions, decimals, and percentage.

BASIC MATHEMATICS PROGRAM

OVERVIEW

GRADE 10

FUNDAMENTAL MATHEMATICAL SKILLS

NUMERATION	BASIC OPERATIONS	FRACTIONS
Reinforces previous topics in numeration; finds roots of numbers; uses the digtial calculator.	Reinforces previous topics; computes mentally; performs all operations with signed numbers; solves linear equations.	Reinforces previous topics.

PRACTICAL APPLICATIONS

CONSUMER GOODS and SERVICES	TAXES	MEASUREMENT (GEOMETRY)
Reinforces mental monetary computations; computes discounts and discount rates; reads and interprets sales receipts; differentiates between types of stores and their pricing practices; compares quality and price of various products.	Calculates sales tax; begins to complete income tax form.	Reinforces graphs; reinforces angles; reinforces the English and the metric systems of measurement; works with tables and maps; constructs scale drawings; works with various measuring instruments for field measurements; works with household weights and measurements.
TRANSPORTATION	**INSURANCE**	**PERSONAL INCOME**
Reads road maps.	Understands school insurance plan.	Calculates job incomes; calculates payroll deductions; reads and understands payroll stubs.
BANKING and FINANCE		
Uses a checking account; uses a savings account; recognizes types of banks, loans & loan institutions.		

BASIC MATHEMATICS PROGRAM

OVERVIEW

GRADE 11

FUNDAMENTAL MATHEMATICAL SKILLS

NUMERATION	BASIC OPERATIONS	FRACTIONS
Reinforces previous topics; uses procedure for rounding off numbers in practical applications; uses the algorithm to find the square roots; computes with a digital calculator.	Reinforces previous topics; demonstrates mental computations; applies short cuts for multiplication; reinforces the computations with signed numbers; solves linear equations.	Reinforces previous topics.

PRACTICAL APPLICATIONS

CONSUMER GOODS and SERVICES	TAXES	MEASUREMENT (GEOMETRY)
Reinforces previous topics; understands and uses various types of credit agreements; understands credit ratings; understands purchasing agreements; uses mathematics skills effectively in leisure time activities.	Calculates sales tax; works with various income tax forms; understands real estate taxes.	Reinforces previous topics; applies the knowledge of geometric figures to practical situations; demonstrates a knowledge of probability.
TRANSPORTATION	**INSURANCE**	**PERSONAL INCOME**
Calculates fares; demonstrates a knowledge of automobile ownership.	Understands school insurance plan, life insurance, and automobile insurance.	Reinforces previous topics; writes a budget; demonstrates a knowledge of retirement income.
BANKING AND FINANCING		
Reinforces previous topics; uses checks; understands special accounts and services; recognizes types of loans and loan institutions; calculates interest on loan.		

BASIC MATHEMATICS PROGRAM

OVERVIEW

GRADE 12

FUNDAMENTAL MATHEMATICAL SKILLS

NUMERATION	BASIC OPERATIONS	FRACTIONS
Reinforces previous topics.	Reinforces previous topics.	Reinforces previous topics.

PRACTICAL APPLICATIONS

CONSUMER GOODS and SERVICES	TAXES	MEASUREMENT (GEOMETRY)
Reinforces previous topics; recognizes impacts of inflationary trends; relates wholesale and retail prices; identifies effects of tariffs and trade laws on the economy; obtains and evaluates estimates on services and products.	Reinforces previous topics; demonstrates a knowledge of other types of taxes.	Reinforces previous topics.
TRANSPORTATION	**INSURANCE**	**INVESTMENTS**
Reinforces previous topics; calculates vehicle leasing costs.	Reinforces previous topics; understands homeowners' insurance, medical insurance plans, mortgage insurance plans, renters' insurance, unemployment insurance, disability, income protection plans, and travel insurance.	Understands bonds, stocks, and other forms of investment; calculates interest and dividends; reads market reports.
BANKING AND FINANCING	**HOUSING COSTS**	**MUNICIPAL FINANCING**
Reinforces previous topics; understands trust funds.	Reads meters; calculates utility bills; interprets rental and mortgage agreements; calculates interest on mortgages.	Reads and interprets budgets; understands municipal financing regulations; traces sources of municipal income; interprets graphs and charts relating to municipal budgets.

TEACHING MATHEMATICS. . . . .HOW TO-

--Discover what the student knows

--Teach what is not known

--Start with the concrete

--Go to the visual

--Use symbols last

--Make mathematics meaningful

--Apply to real life

--Using is remembering

--Not using is losing

--Reinforce interestingly

--Allow options for solving problems

--Aim for quality, not quantity

--Relate mathematics to other subjects

--Remember the competencies

&

DON'T

TRY

2

DO

2

MUCH

2

SOON

ALGEBRA I BASIC OPERATIONS	Level of Ach.
With whole numbers	
Uses the proper order of operations to simplify expressions. .	M
Recognizes symbols of grouping. .	M
( ) parentheses [ ] brackets ____ bar	
Evaluates algebraic expressions given values for the variable . .	M
Uses the communtative and associative properties to simplify expressions	M
Uses the distributive property to simplify expressions	M
Recognizes and uses the following words	Ap
factor coefficient term (like and unlike terms) variable	
Combines like terms using whole numbers	M
With Integers	
Recognizes and uses the following words	M
natural number whole number integers (positive and negative) additive identity additive inverse	
Graphs integers on a number line.	M
Adds integers	M
Subtracts integers.	M
Multiplies integers	M
Divides integers.	M
Combines like terms using integers	M
Evaluates algebraic expressions given integral values for the variable.	M
Uses the distributive property to simplify expressions.	M

ALGEBRA I BASIC OPERATIONS (cont.)	Level of Ach.
With rational numbers	
Recognizes and uses the following words.	M
rational numbers numerator denominator equivalent fractions reciprocals	
SENTENCES	
Solves open sentences, given a replacement set.	M
Equations	
Solves and checks simple linear equations using the addition, subtraction, multiplication, or division property.	M
Solves and checks linear equations in which the terms may be combined	M
Solves and checks linear equations using more than one property . . .	M
Solves and checks linear equations with variables on both sides . . .	M
Solves and checks linear equations with parentheses	Ap
Solves and checks linear equations and graphs solution set.	M
Solves and checks linear equations containing fractions	Ap
Solves and checks linear equations containing decimal fractions . . .	Ap
Solves and checks quadratic equations using factoring.	Ap
Solves literal equations for a specified variable	Ap
Inequalities	
Recognizes the symbols $>, <, \leq, \geq$	M
Graphs solution set for simple inequalities; i.e. $x > -2$.	M

ALGEBRA I SENTENCES (cont.)	Level of Ach.
Inequalities (cont.)	
Solves linear inequalities using addition or subtraction property Graphs solution set.	Ap
Solves linear inequalities using multiplication or divison property Graphs solution set.	Ap
Solves linear inequalities using more than one property. Graphs the solution set	Ap
Solves linear inequalities containing parentheses. Graphs the solution set.	Ap

ALGEBRA I ALGEBRAIC EXPRESSIONS	Level of Ach.
ALGEBRAIC EXPRESSIONS	
Recognizes and uses the terms. . .	M
exponent base monomial	
Solves problems using the product of powers. . . . . (i.e. $x^m \cdot x^n = x^{m+n}$)	M
Solves problems using the power of a power . . . . . (i.e. $(x^m)^n = x^{m \cdot n}$)	Ap
Solves problems using the power of a product . . . . . $(x^m \cdot y^n)^p = x^{m \cdot p} \cdot y^{n \cdot p}$	Ap
Adds monomials	M
Recognizes and uses the terms. . .	Ap
binomial trinomial polynomial	
Multiplies:	
monomials times other polynomials.	M
binomials times binomials. . .	M
binomials times trinomials . .	Ap

ALGEBRA I ALGEBRAIC EXPRESSIONS (cont.)	Level of Ach.
Factors monomials into prime factors.	M
Recognizes the term: Greatest Common Factor (GCF).	M
Factors polynomials by removing a common monomial factor	M
Factors trinomials into prime factors (one variable and more than one)	Ap
Factors the difference of two square into prime factors	Ap
Fractions	
Multiplies fractions: numerical . .	M
algebraic . .	Ap
Simplifies fractions: numerical . .	M
algebraic	
monomial / monomial. . .	Ap
polynomial / monomial. . .	Ap
monomial / polynomial. .	Ap
polynomial / polynomial. .	Ap
Divides fractions: numerical. . . .	M
algebraic. . . .	Ap
Adds fractions with same denominator: numerical.	M
algebraic.	Ap
Recognizes and finds the least common denominator (LCD).	M
Adds fractions with different denominators: numerical	M
algebraic	Ap
Subtracts fractions with:	
like denominators	
numerical.	M
algebraic.	Ap
unlike denominators	
numerical.	M
algebraic.	Ap

ALGEBRA I ALGEBRAIC EXPRESSIONS (cont.)	Level of Ach.

GRAPHING

Defines and uses absolute value. .	Ap
Solves simple equations involving absolute value	Ap
Computes the directed distance between two points on a number line	Ap
Recognizes and uses the terms and symbols.	M

coordinate
coordinate plane
x-axis
y-axis
origin
ordered pair
parallel lines //
perpendicular lines ⊥
vertical lines
horizontal lines
slope
directed distance d(AB)
m(AB) means slope of line AB

Plots and names points in the plane.	K
Computes the directed distance between two points (vertical and horizontal lines).	K
Computes the slope of a line . . .	K

ALGEBRA I APPLICATION PROBLEMS (cont.)	Level of Ach.

APPLICATION PROBLEMS

Solves and checks:

age problems	K
perimeter problems	K
money problems	K
number problems.	K

Mis-Digit

ALGEBRA II BASIC OPERATIONS	Level of Ach.
Recognizes and uses the following terms:	
Complex numbers.	Ap
Real numbers	M
Rational numbers	R
Natural numbers.	R
Whole numbers.	R
Integers	R
Irrational numbers	M
Imaginary numbers.	Ap
Pure Imaginary numbers	Ap
Exponent	R
Equivalent fractions	R
Reciprocal	R
Principal root	Ap
Complex conjugate.	Ap
Recognizes and uses the following symbols:	
$\lvert\ \rvert$ absolute value	M
$\sqrt{\ }$ radical sign	M
i imaginary unit	M
Whole Numbers	
Use the proper order of operations to simplify expressions.	M
Recognizes symbols of grouping . .	M
( ) parentheses [ ] brackets $\overline{\quad}$ bar	
Evaluates algebraic expressions given values for the variable . .	M
Uses the commutative and associative properties to simplify expressions.	R
Uses the distributive property to simplify expressions.	R
Recognizes and uses the following words.	M
factor coefficient term (like and unlike terms) variable	
Combines like terms using whole numbers.	R
Finds the roots of whole numbers with integral answers.	M

ALGEBRA II BASIC OPERATIONS (cont.)	Level of Ach.
Whole numbers (cont.)	
Finds the roots of whole numbers with irrational answers.	Ap
Evaluates whole numbers with	
positive integral exponents. .	M
negative integral exponents. .	M
zero exponent.	M
rational exponent.	Ap
Finds absolute value of whole numbers.	M
Integers	
Recognizes and uses the following terms.	R
additive identity additive inverse	
Graphs integers on a number line .	R
Adds integers.	R
Subtracts integers	R
Multiplies integers.	R
Divides integers	R
Combines like terms using integers	R
Evaluates algebraic expressions given integral values for the variable	R
Uses the distributive property to simplify expressions.	R
Finds the roots of integers with whole number answers	M
Finds the roots of integers with irrational answers	Ap
Finds the roots of integers with imaginary answers.	Ap
Evaluates integers with	
positive integral exponents. .	M
negative integral exponents. .	M
zero exponent.	M
rational exponent.	Ap

ALGEBRA II BASIC OPERATIONS (cont.)	Level of Ach.
Integers (cont.)	
Finds absolute values of integers.	M
Rational Numbers	
Finds the roots of rational numbers with rational answers. . .	M
Finds the roots of rational numbers with irrational answers. .	Ap
Finds the roots of rational numbers with imaginary answers . .	Ap
Simplifys radical expressions by rationalizing the denominators.	M
Evaluates rational numbers with	
positive integral exponents. .	M
negative integral exponents. .	M
zero exponent.	M
rational exponent.	Ap
Finds absolute value of rational numbers.	M
Irrational Numbers	
Adds irrational numbers.	Ap
Subtracts irrational numbers . . .	Ap
Multiplies irrational numbers. . .	Ap
Divides irrational numbers	Ap
Evaluates irrational numbers with	
positive integral exponents. .	Ap
negative integral exponents. .	Ap
zero exponent.	M
Imaginary numbers	
Converts radical expressions to i form	Ap
Adds pure imaginary numbers. . . .	Ap
Subtracts pure imaginary numbers .	Ap
Multiplies pure imaginary numbers.	Ap
Divides pure imaginary numbers . .	Ap
Evaluates pure imaginary numbers with positive integral exponents .	Ap

ALGEBRA II BASIC OPERATIONS (cont.)	Level of Ach.
Imaginary numbers (cont.)	
Adds imaginary numbers ($a + bi$ form).	Ap
Subtracts imaginary numbers ($a + bi$ form).	Ap
Multiplies imaginary numbers ($a + bi$ form).	Ap
Divides imaginary numbers ($a + bi$ form).	Ap
Finds absolute value of an imaginary number	K
SENTENCES	
Equations	
Solves and checks simple linear equations using the addition, subtraction, multiplication, or division property.	R
Solves and checks linear equations in which the terms may be combined	R
Solves and checks linear equations using more than one property . . .	R
Solves and checks linear equations with variables on both sides . . .	R
Solves and checks linear equations with parentheses	M
Solves and checks linear equations and graphs solution set.	R
Solves and checks linear equations containing fractions	M
Solves and checks linear equations containing decimal fractions . . .	M
Solves literal equations for a specified variable	M
Solves and checks quadratic equations using factoring.	M

ALGEBRA II SENTENCES (cont.)	Level of Ach.
Equations (cont.)	
Solves quadratic equations by graphing.	Ap
Solves quadratic equations by "completion of the square" method	Ap
Solves quadratic equations by "quadratic formula"	Ap
Uses the discriminant to determine the nature of the solution of a quadratic equation.	K
Uses the Sum and Product of Solutions to check answers in a quadratic equations	K
Solves equations containing radicals.	K
Inequalities	
Recognizes the symbols $>, <, \leq, \geq$	M
Graphs solution set for simple inequalities; i.e. $x>-2$.	M
Solves linear inequalities using addition or subtraction property. Graphs solution set	M
Solves linear inequalities using multiplication or division property. Graphs solution set	M
Solves linear inequalities using more than one property. Graphs the solution set.	M
Solves linear inequalities comtaining parentheses. Graphs the solution set.	M
Solves quadratic inequalities using graphing. Graphs the solution set.	Ap
Solves quadratic inequalities using factoring. Graphs the solution set.	Ap

ALGEBRA II ALGEBRAIC EXPRESSIONS	Level of Ach.
Recognizes and uses the terms. . .	R
exponent base monomial	
Solves problems using the product of powers. . . . . (i.e. $x^m \cdot x^n = x^{m+n}$)	R
Solves problems using the power of a power. . . . . (i.e. $(x^m)n = x^{m \cdot n}$	M
Solves problems using the power of a product . . . . . $(x^m \cdot y^n)p = x^{m \cdot p} \cdot y^{n \cdot p}$	M
Adds monomials	R
Recognizes and uses the terms. . .	M
binomial trinomial polynomial	
Multiplies:	
monomials times other polynomials.	M
binomials times binomials. . .	M
binomials times trinomials . .	R
Factors monomials into prime factors.	R
Recognizes the term: Greatest Common Factor (GCF).	R
Factors polynomials by removing a common monial factor	R
Factors trinomials into prime factors (one variable and more than one).	M
Factors the difference of two squares into prime factors	M
Factors the sum or difference of two cubes into prime fadtors. .	M
Fractions	
Multiplies fractions	M

ALGEBRA II ALGEBRAIC EXPRESSIONS (cont.)	Level of Ach.
Fractions (cont.)	
Simplifies fractions:	
$\frac{\text{monomial}}{\text{monomial}}$	M
$\frac{\text{polynomial}}{\text{monomial}}$	M
$\frac{\text{monomial}}{\text{polynomial}}$	M
$\frac{\text{polynomial}}{\text{polynomial}}$	M
Divides fractions	M
Adds fractions with same denominator	M
Recognizes and finds least common denominator (LCD)	M
Adds fractions with different denominators	M
Subtracts fractions with	
like denominators	M
unlike denominators	M
Simplifies complex fractions	Ap
GRAPHING	
Defines and uses absolute value	M
Solves simple equations involving absolute value	M
Computes the directed distance between two points on a number line	Ap

ALGEBRA II GRAPHING (cont.)	Level of Ach.
Recognizes and uses the terms and symbols	M
coordinate coordinate plane x-axis y-axis origin ordered pair parallel lines // perpendicular lines $\perp$ vertical lines horizontal lines slope directed distance $\overrightarrow{d(AB)}$ m(AB) means slope of line AB abscissa ordinate x intercept y intercept	
Plots and names points in the plane	M
Computes the directed distance between two points (vertical and horizontal lines)	Ap
Computes the slope of a line	Ap
Graphs linear equations by making a table	M
Graphs linear equations using slope-intercept form	M
Graphs linear equations using point-slope form	Ap
Uses the Pythegorean Theorem	Ap
Finds distances between points on a coordinate plane	Ap
Finds the midpoint of a line segment on a coordinate plane	Ap
Recognizes parallel lines by comparing slopes	Ap
Recognizes perpendicular lines by comparing slopes	Ap

ALGEBRA II FUNCTIONS	Level of Ach.
Defines the following terms. . . .	Ap
function relation domain range dependent variable independent variable	
Determines values of functions using the proper function notation	Ap
Identifies special functions . . .	Ap
Graphs the following functions . .	Ap
linear function constant function quadratic function absolute value function greatest integer function [x]	
Evaluates composite functions. . .	Ap

ALGEBRA II SYSTEMS OF EQUATIONS	Level of Ach.
Solves linear systems with two equations by graphing.	Ap
Solves linear systems with two equations by addition.	Ap
Solves linear systems with two equations by substitution.	Ap
Recognizes consistent systems. . .	Ap
independent dependent	
Recognizes inconsistent systems. .	Ap
Solves systems of three linear equations by addition.	Ap
Finds real solution of systems with one quadratic and one linear equation	Ap
Solves systems of two linear inequalities by graphing	Ap

ALGEBRA II APPLICATION PROBLEMS	Level of Ach.
Solves and checks	
age problems.	Ap
perimeter and area problmes . .	Ap
money problems.	Ap
number problems	Ap
work problems	Ap
mixture problems.	Ap
motion problems	Ap

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GEOMETRY LANGUAGE	Level of Ach.
Names and decribes the following undefined terms of geometry	
point.	R
line	R
plane	
Writes a connotative definitions	M
Reaches conclusions by applying definitions.	M
Distinguishes between the terms: axiom, postulate assumption and theorem.	M
Knows postulates using basic operations	
addition postulate of equality	M
subtraction postulate of equality	M
multiplication postulate of equality	M
division postulate of equality	M
Knows the postulates of equality	
reflexive property	M
symmetric property	M
transitive property.	M
Knows the following postulates:	
The shortest distance between two points is the length of straight line segment joining them	M
The number of lines that may be passed through one point is infinite.	M
Two points determine one and only one straight line . . .	M
Two straight lines can intersect in only one point.	M
A line segment may be extended indefinitely in either direction	M
A line segment has one and only one midpoint.	M
Two straight lines in the same plane are either parallel lines or intersecting lines.	M

GEOMETRY LANGUAGE (cont.)	Level of Ach.
Two parallel lines are everywhere equidistant.	M
Through a given point not on a given line one and only one line can be drawn parallel to the given line. (Parallel Postulate)	M
Reaches conclusions by applying basic postulate.	M
Interprets a conditional statement:	
selects the hypotheses	M
selects the conclusion	M
Writes other forms of a conditional statement	
converse	M
inverse.	K
contrapositive	K
Knows the postulates of inequality:	
addition postulate of inequality	Ap
subtraction postulate of inequality	Ap
multiplication postulate of inequality	Ap
division postulate of inequality	Ap
Knows the Law of the Excluded Middle	K
Knows the Law of Contradiction . .	K
Writes a statement in conditional form	M
Identifies the elements of a formal proof.	M
Draws and labels a figure to intrepret a conditional statement . . .	M
Identifies the "given" and "conclude" or "prove" (in terms of a figure) for a conditional statement. . . .	M
Writes a proof. (Statement - Reason form)	Ap
Defines the following terms:	
theorem.	M
corollary.	M

GEOMETRY LANGUAGE (cont.)	Level of Ach.
Identifies the elements of an indirect proof.	M
Writes an indirect proof.	K

GEOMETRIC FIGURES

Defines the following terms:	
line segment.	R
ray	R
angle	R
Uses the following symbols:	
$\overleftrightarrow{AB}$ line AB.	R
$\overline{AB}$ line segment AB.	R
$\overrightarrow{AB}$ ray AB	R
$\angle$ angle.	R
$\perp$ perpendicular lines. . . .	M
// parallel lines	M
$\cong$ is congruent to.	M
$\sim$ is similar to.	M
Writes a connotative definition for the following:	
midpoint of a line segment. .	M
bisector of a line segment. .	M
congruent line segments . . .	M
Uses a ruler to measure a line segment	R
Uses a number line to find the length of a line segment.	M
Names these geometric figures properly	
line.	M
line segment.	M
ray	M
angle	M

GEOMETRY GEOMETRIC FIGURES (cont.)	Level of Ach.
Identifies the following:	
vertex of an angle.	R
sides of an angle	R
Uses a protractor to measure angles	R
Classifies angles by size and rotation.	R
Define the following terms associated with angles:	
complementary angles.	M
supplementary angles.	M
bisector of an angle.	M
congruent angles.	M
vertical angles	M
adjacent angles	M
Applies theorems concerning angles.	
complementary angles.	Ap
supplementary angles.	Ap
vertical angles	Ap
Defines "perpendicular lines" . . .	M
Identifies perpendicular lines. . .	M
Applies theorems about perpendicular lines	Ap
Describes a dihedral angle.	Ap
Labels parts of a dihedral angle	
faces (half plane).	Ap
edge.	Ap
Defines parallel lines.	M
Distinguishes between perpendicular, parallel and skew lines	M
Draws two lines cut by a transversal and identifies the following:	
corresponding angles.	R
alternate interior angles . . .	R
alternate exterior angles . . .	R
Applies theorems concerning angles and parallel lines.	Ap
Applies theorems to prove that two lines are parallel.	Ap
Defines parallel planes	Ap

GEOMETRY GEOMETRIC FIGURES (cont.)	Level of Ach.
Applies postulates and theorems to determine a plane.	K
Defines the term "polygon".	M
Distinguishes between convex and concave polygons.	M
Labels polygons properly.	M
Defines the following terms:	
congruent polygons.	M
similar polygons.	M
Identifies corresponding parts of congruent or similar polygons . . .	M
Identifies exterior and interior angles of polygons.	M
Defines the term "triangle"	R
Classifies triangles according to their sides	
scalene triangle.	R
isosceles triangle.	R
equilateral triangle.	R
Classifies triangles according to their angles	
right triangle.	R
acute triangle.	R
obtuse triangle	R
Identifies the following angles of triangles	
exterior angles of a triangle .	M
interior angles of a triangle .	M
remote interior angles of a triangle (opposite)	M
Applies theorems concerning angles of a triangle	
The measure of an exterior angle of a triangle is greater than the measure of either remote interior angles (opposite).	Ap
The measure of an exterior angle of a triangle is equal to the sum of the measure of its remote interior angle (opposite).	Ap

GEOMETRY GEOMETRIC FIGURES (cont.)	Level of Ach.
The sum of the measures of the angles of a triangle is 180° . . .	M
Identifies parts of an isosceles triangle	
base angles.	M
base	M
legs	M
vertex angle	M
Applies theorems concerning isosceles triangles	
Base angles of an isosceles triangle are congruent	Ap
If two angles of a triangle are congruent, the sides opposite these angles are congruent . .	Ap
An equilateral triangle is equiangular.	Ap
Identifies the parts of a right triangle	
legs	M
hypotenuse	M
Applies theorems concerning right triangles	
The acute angles of a right triangle are complementary . .	Ap
Pythagorean Theorem.	M
3-4-5 right triangle form of the Pythagorean Theorem. . . .	Ap
Isosceles right triangle form of the Pythagorean Theorem . .	Ap
30° - 60° right triangle form of the Pythagorean Theorem . .	Ap
Identifies the following line segments	
altitudes.	M
angle bisector	M
median	M
Proves two triangles congruent using the following theorems:	
SSS.	M
ASA.	M
SAS.	M
AAS.	M

GEOMETRY GEOMETRIC FIGURES (cont.)	Level of Ach.
Proves corresponding parts of triangles congruent.	Ap
Writes ratios in simplest form . .	M
Identifies proportions	M
Identifies the following in a proportion:	
1st term	M
2nd term	M
3rd term	M
4th term	M
means.	M
extremes	M
mean proportional (geometric mean).	M
Writes a man proportion.	Ap
Finds a missing term in a proportion	M
Writes a proportion given a, b, c, and d in which a · b = c · d . . .	Ap
Identifies similar triangles . . .	M
Identifies corresponding angles and sides in similar triangles . .	M
Determines angle measures and lengths of sides in similar triangles.	Ap
Writes and solves proportions when a line cuts two sides of a triangle and is parallel to the third side	K
Proves two triangles similar using the following theorems of similarity	
AA Theorem of Similarity . . .	K
SAS Theorem of Similarity. . .	K
SSS Theorem of Similarity. . .	K
Finds the measure of a side of a triangle using similarity theorem and proportions.	K
Finds the perimeter of a triangle.	R
Applies the formula to find the area of a triangle	R
Finds the ratios of areas of similar triangles.	Aw

GEOMETRY GEOMETRIC FIGURES (cont.)	Level of Ach.
Finds the ratios of perimeter of similar triangles.	Aw
Applies theorems concerning inequalities in triangles	Aw
Defines the following terms:	
quadrilateral	R
parallelogram	R
rectangle	R
rhombus	R
square.	R
trapezoid	R
isosceles trapezoid	R
Classifies quadrilateral.	M
Identifies the properties of quadrilaterals.	M
Applies theorems to prove that a quadrilateral is a	
parallelogram	Ap
rectangle	Ap
square.	Ap
rhombus	Ap
trapezoid	Ap
isosceles trapezoid	Ap
Identifies the median and the altitudes in a trapezoid.	M
Applies theorems to prove quadrilaterals are congruent	Aw
Finds the perimeter of a quadrilateral.	R
Applies formulas to find areas of	
parallelogram	M
rectangle	R
square.	R
rhombus	M
trapezoid	M
Defines the terms "regular polygon"	M
Classifies polygons according to their number of sides	R
Develops the formula for finding the sum of the angle measure of any convex polygon.	K
Applies the formula for finding the sum of the angle measures of any convex polygon.	Ap

GEOMETRY GEOMETRIC FIGURES (cont.)	Level of Ach.
Develops the theorem for the sum of the exterior angles of any convex polygon.	Ap
Determines the angle measure of each angle of a regular polygon	Ap
Finds the perimeter of regular polygons.	M
Applies the formula for finding the area of a regular polygon . .	Ap
Defines circles	M
Identifies segments and lines related to circles.	
chord	M
diameter.	M
radius.	M
secant.	M
tangent	M
line of centers	M
Applies theorem concerning tangents and circles	Ap
Applies theorems concerning chords and radii of circles.	Ap
Applies theorems for finding ratios and products of lengths of secant or tangent segments. . . .	Ap
Identifies major arcs, minor arcs and semicircles	M
Finds the measure of an arc in degrees	M
Identifies congruent arcs	M
Finds relationships between arcs and chords.	Ap
Finds the measure of a central angle of a circle	M
Finds the measure of an inscribed angle of a circle	M
Finds the measure of an angle formed by two secants to a circle	Ap
Finds the measure of an angle formed by a secant and a tangent to a circle	Ap

GEOMETRY GEOMETRIC FIGURES (cont.)	Level of Ach.
Finds the measure of an angle formed by two chords of a circle. .	Ap
Finds the measure of an angle formed by a tangent and a chord of a circle.	Ap
Applies the formulas for finding the circumference of a circle. . .	R
Applies the formula for finding the area of a circle	R
Finds the length of an arc	Ap
Finds areas of regions determined by arcs, chords, and radii of a circle	Ap
Defines "geometric solid".	M
Defines "polyhedron"	M
Draws or builds a model of a polyhedron and identifies its parts: (faces, edged, vertices and diagonals)	M
Classifies polyhedrons according to the number of faces	M
Identifies the five regular polyhedrons.	K
Draws or builds a prism and identifies the following:	
bases.	M
lateral face	M
lateral edge	M
altitude	M
right section.	Ap
oblique section.	Ap
axis	M
Distinguishes between a right prism and an oblique prism	K
Identifies a truncated prism . . .	K
Finds the lateral area of a prism.	Ap
Finds the volume of a prism. . . .	Ap
Identifies the following prisms:	
regular prism.	K
triangular prism	K
quadrangular prism	K
parallelepiped	K
rectangular solid.	M
cube	M

GEOMETRY GEOMETRIC FIGURES (cont.)	Level of Ach.
Draws or builds a cylinder and identifies its parts: (bases, lateral surfade, altitude, axis).	Ap
Distinguish between a right cylinder and an oblique cylinder.	K
Identifies a "cylinder of revolutions".	K
Finds the lateral area of a cylinder.	Ap
Finds the volume of a cylinder. .	Ap
Draws or builds a pyramid and identifies its parts: (pyramidal surface, vertex, altitude, axic, slant height, lateral edge, lateral faces).	M
Identifies pyramids according to the shape of their bases (triangular, quadrangular, etc...)	K
Identifies a regular pyramid. . .	K
Identifies a truncated pyramid and a frustum of a pyramid.	Aw
Finds the lateral area of a pyramid	K
Finds the volume of a pyramid . .	K
Draws or builds a cone and identifies its parts (base, lateral surface, altitude, axis, slant height) . .	Ap
Distinguishes between a right and an oblique cone	K
Identifies a frustum of a cone and a truncated cone.	Aw
Identifies a "cone of revolutions"	K
Finds the lateral area of a cone.	K
Finds the volume of a cone. . . .	K
Draws a sphere and identifies its parts (radius, diameter, surface)	M
Identifies a hemisphere	M
Finds the surface area of a sphere	K
Finds the volume of a sphere. . .	K

GEOMETRY GEOMETRIC FIGURES (cont.)	Level of Ach.
Defines "locus of points".	Ap
Interprets theorems concerning locus of points	
in a plane	K
in space	K
Sketches and describes geometric figures which satisfy given conditions.	K
Sketches and describes the locus determined by the intersection of two or more loci	Aw
Sketches and describes loci in space.	Aw

CONSTRUCTIONS

Constructs congruent line segments	M
Bisects an angle	M
Constructs congruent plane angles.	M
Constructs the perpendicular bisector of a line segments	M
Constructs a perpendicular to a line at a given point on the line.	M
Constructs a perpendicular to a line from a point not on a line. .	M
Constructs angles:	
90°	M
45°	
60°	
Constructs triangles	
given three sides.	Ap
given two sides and an included angle.	Ap
given two angles and an included side	Ap
given two angles and a side not included between the two angles	Ap

GEOMETRY CONSTRUCTIONS (cont.)	Level of Ach.
Constructs the following lines or line segments in triangles:	
altitudes of a triangle. . .	Ap
medians of a triangle. . . .	Ap
angle bisectors of a triangle	Ap
perpendicular bisectors of the sides of a triangle. . .	Ap
Divides a line segment into any number of given parts	Aw
Constructs a tangent to a circle at a given point on the circle. .	K
Constructs a tangent to a circle from a given external point . . .	K
Inscribes a circle in a regular polygon	K
Circumscribes a circle about a regular polygons.	K
Constructs a regular polygon. . .	Ap
Constructs a circle given three noncollinear points	K
Constructs a right angle by inscribing it in a semicircle . .	K
Constructs parallel lines	Ap
Reflects a point over a given line and identifies the following: reflection image, perimage and line of reflection.	Aw
Reflects the following:	
line.	Aw
ray	Aw
segment	Aw
angle	Aw
polygon	Aw
Identifies the symmetry line in reflection-symmetric figures .	Aw
Identifies and performs the following transformation:	
translation	Aw
rotation.	Aw
size change	Aw

TRIGONOMETRY FORMULAS AND DEFINITIONS	Level of Ach.
Defines a vector	M
Defines a resultant in vector addition	M
Defines equivalent vectors	M
Defines a vector quantity.	M
Defines a scalar	M
Defines the mill or zero vector. .	M
Defines a centered vector.	M
Defines an angle	M
Defines angles in degrees, minutes, and seconds.	M
Defines the Greek letters most frequently used for angles	M
θ (theta) ϕ (phi) α (alpha) β (beta)	
Defines the parts of an angle: . .	M
initial side terminal side vertex	
Defines positive and negative angles	M
Defines:	M
coordinate axis quadrants abscissa (x) ordinate (y) radius vector (r)	
Defines an angle in standard position	M
Defines coterminal angles.	M
Defines the six trigonometric functions and their abbreviations in terms of.	M
x, y and r abscissa, ordinate, radius vector opposite side, adjacent side, hypotenuse	
Defines functions and relations. .	M

TRIGONOMETRY FORMULAS AND DEFINITIONS (cont.)	Level of Ach.
Defines the reciprocal functions in terms of x, y and r.	M
Defines a quadrantal angle.	M
Defines a reference angle	M
Defines an increasing function. . .	M
Defines a decreasing function . . .	M
Defines the tabular difference when interpolating.	M
Defines a unit circle	M
Defines line values of the trigonometric functions	M
Defines a periodic function	M
Defines asymptotes.	M
Defines polar coordinate including the terms:.	M
pole polar axis direction-angle polar distance	
Defines the rectangular components of a vector	M
Writes the formula for converting from rectangular to polar coordinate.	Ap
Writes the formula for converting from polar to rectangular coordinate.	Ap
Writes the distance formula for finding the distance between any two points on the coordinate plane	M
Writes the formula for the area of a triangular region. . . . . (i.e. Given $\triangle ABC$, $K = 1/2\ bc \sin A$)	Ap
Defines a radian.	M
Defines a central angle	M
Writes the formula for arc length on a circle. . . . . (i.e. $s = r\theta$ arc length = radius x central angle)	M

Level of Ach.

Writes the formula for the linear velocity of a moving body. . . . . M

(i.e. $v = \frac{s}{t}$

linear velocity = $\frac{\text{distance}}{\text{time}}$)

Write the formula for the angular velocity of a moving body in a circular pattern . . . . . M

(i.e. $w = \frac{\theta}{t}$

angular velocity = $\frac{\text{central angle measure (in radians)}}{\text{time}}$)

Defines trigonometric identities. M

Defines conditional equations . . M

Defines the trigonometric functions in terms of the reciprocals of other trigonometric functions . . M

Defines the FUNDAMENTAL IDENTITIES: . . . . . M

Quotient Relations

$$\tan\theta = \frac{\sin\theta}{\cos\theta}$$

$$\operatorname{ctn}\theta = \frac{\cos\theta}{\sin\theta}$$

The Pythagorean Relations

$$\sin^2\theta + \cos^2\theta = 1$$

$$1 + \tan^2\theta = \sec^2\theta$$

$$1 + \operatorname{ctn}^2\theta = \csc^2\theta$$

Defines the Law of Cosines. . . . M

Defines the Law of Sines. . . . . M

Defines cofunctions . . . . . M

Writes the formula for: . . . . . Ap

sine of the sum of two angles

$$\sin(\theta+\phi) = \sin\theta\cos\phi + \cos\theta\sin\phi$$

sine of the difference of two angles

$$\sin(\theta-\phi) = \sin\theta\cos\phi - \cos\theta\sin\phi$$

TRIGONOMETRY
FORMULAS AND DEFINITIONS (cont.)

Level of Ach.

tangent of the sum of two angles

$$\tan(\theta+\phi) = \frac{\tan\theta + \tan\phi}{1 - \tan\theta\tan\phi}$$

tangent of the difference of two angles

$$\tan(\theta-\phi) = \frac{\tan\theta - \tan\phi}{1 + \tan\theta\tan\phi}$$

consine of the sum of two angles

$$\cos(\theta+\phi) = \cos\theta\cos\phi - \sin\theta\sin\phi$$

cosine of the difference of two angles

$$\cos(\theta-\phi) = \cos\theta\cos\phi + \sin\theta\sin\phi$$

Defines cofunctions. . . . . M

Writes the double angle formulas . Ap

sine of twice an angle

$$\sin 2\theta = 2\sin\theta\cos\theta$$

cosine of twice an angle

$$\cos 2\theta = \cos^2\theta - \sin^2\theta$$

tangent of twice an angle

$$\tan 2\theta = \frac{2\tan\theta}{1 - \tan^2\theta}$$

Writes the half angle formulas . . Ap

sine of one half of an angle

$$\sin\frac{\theta}{2} = \pm\sqrt{\frac{1 - \cos\theta}{2}}$$

cosine of one half of an angle

$$\cos\frac{\theta}{2} = \pm\sqrt{\frac{1 + \cos\theta}{2}}$$

tangent of one half of an angle

$$\tan\frac{\theta}{2} = \pm\sqrt{\frac{1 - \cos\theta}{1 + \cos\theta}}$$

$$\tan\frac{\theta}{2} = \pm\frac{\sin\theta}{1 + \cos\theta}$$

$$\tan\frac{\theta}{2} = \pm\frac{1 - \cos\theta}{\sin\theta}$$

Defines what is meant by "solving a triangle". . . . . M

TRIGONOMETRY FORMULAS AND DEFINITIONS (cont.)	Level of Ach.
Defines a vertical line.	M
Defines a plumb line	M
Defines a vertical line.	M
Defines a horizontal line.	M
Defines a horizontal plane	M
Defines the angle of elevation . .	M
Defines the angle of depression. .	M
Defines the tangent of the angle of inclination as the slope of a line	M
Defines an oblique triangle. . . .	M
Defines the terms:	K
knot (nautical mile) heading (as a direction) track course ground speed tail wind air speed headwind drift angle bearing	
Defines significant digits	Ap
Defines standard or scientific notation	M
Defines the terms.	M
exponent index base logarithm (log) commom (Briggs) natural (Napierian)	exponential notation characteristic mantissa antilogarithm (antilog)
Defines the following logarithmic properties:.	Ap
the logarithm of a product is equal to the sum of the logarithms of the factors	
the logarithm of a quotient is equal to the logarithm of the dividend minus the logarithm of the divisor	
the logarithm of a power of a number is equal to the exponent times the logarithm of the number.	

TRIGONOMETRY FORMULAS AND DEFINITIONS (cont.)	Level of Ach.
the logarithm of a root of a number is equal to the logarithm of the number divided by the index of the root.	
Defines the theorem:	
"the logarithm of a number N to the base b is equal to the logarithm of N to the base a divided by the logarithm of b to the base a.".	K
ANGLES	
Constructs positive and negative angles	M
Constructs angles in the various quandrants and those coinciding with an axis (quadrantal angles) .	M
Constructs angles in standard position	M
Finds the reference angle for any angle in standard position	M
Converts from degree measure to radian measure keeping π . [Exact Measure].	M
Converts from radian measure (with π) to degree measure. . . .	M
Converts from degree measure to radian measure using the conversion tables [Approximate Measrue] . .	M
Converts from radian measure to degree to measure using the conversion tables.	M

TRIGONOMETRY FUNCTIONS AND RELATIONS	Level of Ach.
Determines if a trigonometric function is positive or negative in a particular quadrant.	M
Finds the value of the six trigonometric functions of any angle θ given the coordinate of a point on the terminal side of θ when placed in standard position.	M
Finds the value of the six trigonometric functions of any angle θ given one member of an ordered pair on the terminal side of θ and the length of the radius vector	M
Computes the exact values of the six trigonometric functions for angle of 30°, 45°, 60° . . .	M
Computes the exact values of the six trigonometric functions for any angle θ where $\theta° < \theta < 360°$, and θ has reference angles of either 30°, 45° or 60°. (i.e. angles such as 120°, 135°, 210°, 330°, etc.)	M
Computes the values of the six trigonometric functions of the quadrantal angles from zero to 360° and from - 360° to zero. . . .	M
Computes the values of the remaining trig. functions given one of the functional values of a given angle	M
Computes the values of the other five trig. functions given one of the functional values and the sign (either positive or negative) of another function of the given angle.	M
Finds the value of a function using the table of natural functions	M
Uses the process of interpolation to compute the value of a function using the table of natural functions	M
Expresses functions of angles in terms of functions of reference angles.	M

TRIGONOMETRY FUNCTIONS AND RELATIONS (cont.)	Level of Ach.
Uses the table of natural functions to find the value of a function by using the reference angle of any given angle.	M
Computes the values of functions of angles in a right triangle. . .	M
Uses the process of interpolation to find the angle given the value of a function of the angle using the table of natural functions	M
Finds the sides and angles of a right triangle given the right angle and:	Ap
one acute angle and a side two sides	
Constructs line values for the functions of any angle θ	Ap
Determines whether a function is increasing or decreasing on a particular interval.	Ap
Constructs a graphs of the six trig. functions from - 360° to +360°	Ap
Determines the period for each of the six trig. functions.	Ap
Graphs points in the system of polar coordinates.	M
Converts from rectangular coordinates to polar coordinates	Ap
Converts from polar coordinates to rectangular coordinates.	Ap
Computes the distance between any two points in the Cartesian plane.	M
Computes the area of a triangular region, given the pole, a point on the polar axis, and any point in the polar plane as vertices of the triangle	Ap
Expresses the function of an angle in terms of another function of the angle.	Ap
Simplifies trigonometric expressions using the fundamental relations of single angles.	Ap

TRIGONOMETRY FUNCTIONS AND RELATIONS (cont.)	Level of Ach.
Proves trigonometric identities using the fundamental relations of single angles.	Ap
Solves conditional trigonometric equations using the fundamental relations of single angles. . . .	Ap
Finds the sine of the difference of two angles	Ap
Finds the cosine of the difference of two angles	Ap
Finds the tangent of the difference of two angles	Ap
Finds the sine of the sum of two angles.	Ap
Finds the cosine of the sum of two angles.	Ap
Finds the tangent of the sum of the two angles.	Ap
Expresses functions of complementary angles as cofunctions. . . .	Ap
Finds the sine of twice an angle	Ap
Finds the cosine of twice an angle	Ap
Finds the tangent of twice an angle	Ap
Finds the sine of half an angle .	Ap
Finds the cosine of half an angle	Ap
Finds the tangent of half an angle	Ap
Solves oblique triangles using the law of cosines given:	Ap
two sides and the included angle the three sides	
Solves oblique triangles using the law of sines given:	Ap
two angles and a side opposite one of them two sides and an angle opposite one of them	

TRIGONOMETRY FUNCTIONS AND RELATIONS (cont.)	Level of Ach.
LOGARITHMS AND APPROXIMATE NUMBERS	
Rounds off numbers using the rule: "When the digit 5 (or the digit 5 followed by one or more zeros) is dropped in rounding off a number, the preceding digit is increased by one if it is odd, but left unchanged if it is even."	M
Names the significant digits of a given number	Ap
Computes with approximate numbers (i.e. adds, subtracts, multiplies, and divides).	Ap
Expresses numbers in standard or scientific notation.	M
Works computational problems in scientific notation	Ap
Converts from exponential notation to logarithmic notation	M
Converts from logarithmic notation to exponential notation	M
Finds the logarithms (common) of numbers using logarithm tables [with positive and negative characteristics].	M
Finds the antilogarithms of given numbers	M
Finds logarithms by interpolation .	Ap
Finds antilogarithms by interpolation.	Ap
Computes the problems of multiplication, division, addition, subtraction, finding roots and raising numbers to powers using logarithms.	Ap
Solves simple exponential and logarithmic equations	Ap

TRIGONOMETRY LOGARITHMS AND APPROXIMATE NUMBERS (cont.)	Level of Ach.

APPLICATION PROBLEMS

Solves force problems using vector addition.	Ap
Solves arc length problems using the formula	Ap
arc length = radius x central angles ($s = r\theta$)	
Solves problems involving linear velocity.	Ap
Solves problems involving angular velocity.	Ap
Solves problems involving angles of elevation (or inclination) and angles of depression.	Ap
Solves triangles that are formed by vectors	Ap
Solves simple navigation problems .	Ap

TRIGONOMETRY VECTORS (cont.)	Level of Ach.

VECTORS

Adds vectors.	M
Constructs equivalent vectors . . .	M
Multiplies vectors by scalars (real numbers).	M
Subtracts vectors	M

ANALYTIC GEOMETRY DEFINITIONS AND THEOREMS	Level of Ach.
Defines the set of real numbers. .	M
Defines absolute value of real numbers.	M
Finds the directed distance from one point to another	M
Labels points on the coordinate plane or Cartesian Plane	M
Finds the distance between any two points on the coordinate plane	M
Locates and names points on the polar plane.	M
Defines:	M
Pole Polar axis Direction angle or vectorial angle Radius vector	
Converts polar coordinates to rectangular coordinates.	Ap
Converts rectangular coordinates to polar coordinates	Ap
Evaluates (2 x 2), (3 x 3), determinants	Ap
Determines the degree of a polynomial	M
Computes the area of a triangular region on the coordinate plane using determinants	Ap
Defines relations, domain, range .	M
Defines functions.	M
Graphs relations (equations and inequalities)	M
Graphs simple functions.	M
Finds points of intersections of graphs by:	M
graphing applying algebraic methods	
Solves application problems by graphing the data from the problem through algebraic processes. . . .	Ap

ANALYTIC GEOMETRY DEFINITIONS AND THEOREMS (cont.)	Level of Ach.
Solves systems of inequalities by graphing.	M
Rewrites the equation of a curve by translating the axis	Ap
Rewrites the equation of a curve by rotating the axis.	Ap
Proves basic geometric theorems analytically.	Ap
Defines the term locus.	M
Finds the equation for a locus of points given sufficient data. . . .	Ap

ANGLES

Defines an angle.	M
Defines positive and negative angles	M
Defines angles in standard position	M
Defines the trigonometric functions using:.	M
x, y, and r abscissa, ordinate and radius vector adjacent, opposite and hypotenuse	
Defines the angle of inclination. .	M
Defines the slope of a line as the tangent of the angle of inclination of the line	M
Computes the angle formed between two intersecting lines.	Ap

ANALYTIC GEOMETRY LINES	Level of Ach.
Recognizes the equation of a line.	M
Graphs a line given a set of points on the line	M
Determines the slope of a line given any two points on the line .	M
Defines vertical lines and their slopes	M
Defines horizontal lines and their slopes	M
Graphs a line given its slope and a point on the line.	M
Writes the equation of a line given its slope and a point on the line.	M
Writes the equation of a line given two points on the line	M
Graphs a line given its slope and y-intercept.	M
Writes the equation of a line given slope and its y-intercept. . .	M
Recognizes parallel lines by computing their slopes given their equations.	M
Recognizes perpendicular lines by computing their slopes given their equations.	M
Recognizes functions by graphing .	M
Divides a line segment into congruent parts by finding the coordinates for the points of division	Ap
Finds the midpoint of a line segment given the endpoints. .	M
Writes the equation of a line in the form: $Ax + By + C = 0$ where A, B, and C are real numbers and A and B are not both zero.	M
Computes the slope and y-intercept of a line given the equation in the form $Ax + By + C = 0$	M
Finds the perpendicular distance from the origin to any given line on the coordinate plane.	Ap

ANALYTIC GEOMETRY LINES (cont.)	Level of Ach.
Finds the distance from any point in the coordinate plane to any given line in the coordinate plane.	Ap
Writes the polar equation of a straight line	Ap
CONIC SECTIONS	
Defines conic sections.	M
Parabola	
Defines a parabola.	M
Graphs a parabola	M
Defines the following:	
focus	M
directrix	M
axis of symmetry.	M
maximum value	M
minimum value	M
turning point	M
concavity	M
equation of a parabola.	M
transverse axis	Ap
conjugate axis.	Ap
Determines the concavity of a parabola	M
Estimates the maximum or minimum points of a parabola.	Ap
Writes the equation of a parabola with its vertex at the origin	Ap
Writes the equation of a parabola with its vertex at any point on the plane	Ap
Finds the zeros of a parabola:. . . .	Ap
graphically algebraically	
Circle	
Defines a circle.	M
Defines the following:.	M
radius center of a circle	

ANALYTIC GEOMETRY CONIC SECTIONS	Level of Ach.
Circle (cont.)	
Graphs a circle.	Ap
Writes the equation of a circle whose center is at the origin. . .	M
Writes the equation of a circle given its center at any point and its radius	Ap
Finds the center and the radius of a circle given its general equation	Ap
Ellipse	
Defines an ellipse	Ap
Defines the following:	Ap
center major axis minor axis foci vertices	
Graphs an ellipse.	Ap
Writes the equation of an ellipse whose center is at the origin. . .	Ap
Finds the eccentricity of an ellipse.	Ap
Writes the equation of an ellipse given its center at any point. . .	Ap
Finds the intercepts of an ellipse	Ap
Hyperbola	
Defines a hyperbola.	Ap
Defines the following:	
center	Ap
foci	Ap
asymptotes	Ap
vertices	Ap
transverse axis.	Ap
conjugate axis	Ap
Writes the equation of a hyperbola whose center is at the origin. . .	Ap
Finds the intercepts of a hyperbola	Ap
Graphs a hyperbola	Ap

ANALYTIC GEOMETRY CONIC SECTIONS (cont.)	Level of Ach.
Identifies the conic sections given their general equations. . . .	M
Identifies the general equation given the conic sections	M

ADVANCED MATH NUMBER SYSTEMS AND RELATIONS	Level of Ach.
Defines the real number system and its subsets.	R
Knows the Field Postulates of the real numbers under the operations of addition and multiplication . .	M
Knows the Order Postulates for the real numbers	R
Defines open and closed intervals on a number line and graphs them	R
Solves and graphs simple and compound inequalities.	M
Uses mathematical induction to prove mathematical statements involving real numbers	Ap
Defines the concept of absolute value of real numbers.	R
Solves equations and inequalities involving absolute value	M
Defines the terms:	M
relation range independent variable dependent variable range set onto relation into relation	
Defines a function	R
Defines a mapping.	M
Defines onto and into functions. .	M
Defines and computes the value of various composite functions. . . .	M
Defines what is meant by inverse functions.	M
Defines what is meant by the identity function.	M
Defines the set of complex numbers	M
Defines a pure imaginary number. .	M
Performs the operations of addition, subtraction, multiplication, and division with complex numbers. . .	M

ADVANCED MATH NUMBER SYSTEMS AND RELATIONS (cont.)	Level of Ach.
Represents complex numbers in vector form.	M
Defines and computes the absolute value of complex numbers	M
Computes the distance between points on the coordinate plane.	M
Defines the equation of a circle with:.	M
center at the origin center at same point other than the origin	

FUNCTIONS

Defines the wrapping function on a unit circle.	Ap
Maps numbers onto points of the unit circle by using the wrapping function.	Ap
Defines the trigonometric functions as circular functions.	M
Verifies the following using circular functions:.	M
$\forall\, x \in R_1 \ \sin^2 x + \cos^2 x = 1$	
$\forall\, x \in R_1 \ \cos(-x) = \cos x$	
$\forall\, x \in R_1 \ \sin(-x) = -\sin x$	
$\forall\, x \in R$ and $\forall\, n \in W$ $\cos\ (x \pm 2n\pi) = \cos x$	
$\sin\ (x \pm 2n\pi) = \sin x$	
$\forall\, x \in R$ $\cos\ \frac{\pi}{2} + x = -\sin x$	
$\sin\ \frac{\pi}{2} + x = \cos x$	
Knows the cosine x and sine x if $0 \leq x < 2\pi$ and x is an angle whose reference angle is 30°, 45°, or 60° or a quadrantal angle . . .	M

ADVANCED MATH FUNCTIONS (cont.)	Level of Ach.
Graphs the sine and cosine function on a coordinate plane. . .	M
Defines the cycle of the sine and cosine function graph	M
Defines a periodic function	M
Defines the period of a function. .	M
Defines the following terms pertaining to functions:.	M
upper bound lower bound least upper bound (lub) greatest lower bound (glb) amplitude maximum value minimum value frequency	
Computes and graphs the above values for a given function	Ap
Defines and computes the phase shift of a given function	Ap
Uses HERON'S FORMULA (or Hero's) to compute the area of a triangle .	K
Defines the "arc" value of the trigonometric functions. (i.e. arcsin, arccos, etc.)	M
Computes the "arc" value of given functions	M
Defines the principal value of the "arc" functions for the six trigonometric functions	Ap
Solves trigonometric inequalities .	Ap
Represents complex numbers in polar form..	Ap
Knows DeMoivre's Theorem.	Aw
Constructs graphs of polar equations	Ap
Defines a sequence (finite and infinite)	M
Computes terms of a sequence. . . .	M
Defines an arithmetic sequence. . .	Ap
Defines a geometric sequence. . . .	Ap
Defines a harmonic sequence	Ap

ADVANCED MATH FUNCTIONS (cont.)	Level of Ach.
Defines and computes a neighborhood of a point on a number line.	M
Defines and computes the radius of a neighborhood on a number line .	M
Finds the terms in a neighborhood of a given radius for a given sequence	Ap
Defines and computes the limit of a sequence.	Ap
Defines a convergent sequence. . . .	M
Defines a divergent sequence	M
Defines and computes the general neighborhood of a point on a number line	M
Defines and finds the upper bound of a set	Ap
Defines and finds the lower bound of a set	Ap
Defines and finds the least upper bound of a set	Ap
Defines and finds the greatest lower bound of a set	Ap
Knows the axiom: "If A is any nonempty subset of the reals that is bounded above, then A has a least upper bound in the Reals." .	K
Knows the theorem: "If A is any nonempty subset of R that is bounded below, then A has a greatest lower bound in R."	K
Defines a nondecreasing sequence . .	Ap
Defines a nonincreasing sequence . .	Ap
Defines a monotone sequence.	Ap
Knows the theorem: "A nondecreasing sequence which is bounded above has a limit.".	K
Knows the theorem: "A nonincreasing sequence which is bounded below has a limit.".	K
Defines a series	M
Defines what is meant by a partial sum of a series.	M
Defines a convergent series.	M

ADVANCED MATH FUNCTIONS (cont.)	Level of Ach.
Defines a convergent series. . . .	M
Defines a divergent series	M
Defines and computes the limit of an infinite series as the limit of the sequence of partial sums of the series	Ap
Recognizes and uses the symbol "Σ" for summation . . . . . (sigma notation)	M
Knows the theorem: "Any sequence $\{b_n\} = \frac{1}{n^a}$ with $a > 0$ and $a \in R$, converges to zero.".	Ap
Knows the theorem: "Any sequence $\{c\}$ of constants c converts to c".	Ap
Knows the theorem: "If $\|r\| < 1$, then $\{r^n\}$ converges to 0." . . .	Ap
Defines and computes the sum of sequences as a sequence.	M
Defines and computes the difference of sequences as a sequence	M
Defines and computes the product of sequences as a sequence	M
Defines and computes the quotient of sequences as a sequence	M
Defines and computes the limit of the sum of sequences as the sum of the limits of the sequences . .	M
Defines and computes the limit of the difference of sequences as the difference of the limits of the sequences.	M
Defines and computes the limit of the product of sequences as the product of the limits of the sequences.	M
Defines and computes the limit of the quotient of sequences as the quotient of the limits of the sequences.	M
Knows the comparison test for divergence of sequences.	K
Defines and computes the limit of a function as the variable increases without bound.	Ap

ADVANCED MATH FUNCTIONS (cont.)	Level of Ach.
Defines and computes the limit of a function as the variable decreases without bound.	Ap
Finds the neighborhood of a function for a given interval as the variable increases or decreases without bound.	Ap
Defines and computes the limit of a function as the variable approaches a given value.	Ap
Finds the neighborhood of a function for a given interval as the variable approaches a given value.	Ap
Defines and computes the limit of a function as the variable approaches a given value from (smaller to greater) values.	Ap
Defines and computes the limit of a function as the variable approaches a given value from (greater to smaller) values.	Ap
Defines and computes the limit of the sum of functions as the sum of the limits of the functions .	M
Defines and computes the limit of the difference of functions as the difference of the limits of the functions.	M
Defines and computes the limit of the product of functions as the product of the limits of the functions.	M
Defines and computes the limit of the quotient of functions as the quotient of the limits of the functions.	M
Defines and recognizes continuous and discontinuous functions	Ap
Defines and recongizes the two types of discontinuous rational functions:	Ap
a removable discontinuity	
a discontinuity where at least one one-sided limit fails to exist	

ADVANCED MATH FUNCTIONS (cont.)	Level of Ach.
Determines if a function is indeterminate at a given point. . .	Ap
Defines and finds the symptotes for functions	Ap
Defines the derived function of a function as a limit	M
Computes the derived function of a function as a limit	Ap
Defines the derived function of a function geometrically.	M
Computes the tangent to a curve as a limit.	Ap
Knows the theorems for finding the derived function of polynomial functions	M
Defines and recognizes a polynomial over the real numbers	M
Defines and recognizes polynomial function over the real numbers. . .	M
Defines and recognizes a constant function.	M
Defines and recognizes a linear function.	M
Defines and finds the real zeros of a function	Ap
Defines and recognizes a quadratic function.	M
Defines and finds the 1. axis of symmetry 2. turning point 3. concavity 4. zeros of a given function.	Ap
Uses the discriminant of the quadratic formula to determine the nature of the zeros for a quadratic function.	M
Uses synthetic substitution to evaluate polynomial functions for given values of the variable. .	M
Defines the depressed polynomial in synthetic substitution	M
Defines and uses the Remainder Theorem when evaluating polynomial functions.	Ap

ADVANCED MATH FUNCTIONS (cont.)	Level of Ach.
Defines and uses the Factor Theorem in finding zeros of polynomial function.	Ap
Locates real zeros of polynomial functions using the concepts of upper and lower bounds	Ap
Finds rational zeros of polynomial functions.	Ap
Knows the FUNDAMENTAL THEOREM OF ALGEBRA.	M
Defines and finds multiple zeros (multiplicity) and simple zeros of polynomial functions.	Ap
Defines the sum of multiplicities of the zeros of a polynomial function as the degree of the function (provided the degree is greater than zero)	M
Defines and computes the relative and absolute minimum values of a function	Ap
Defines and computes the relative and absolute maximum values of a function	Ap
Defines and computes the critical point of a function.	Ap
Defines and computes points of inflection of a function	Ap
Sketches polynomial functions. . . .	Ap
Finds intervals of concavity of a function	Ap
Finds whether a function is concave upward or cancave downward on a given interval	Ap
Restricts the domain on algebraic functions so the function has real values	Ap
Defines exponential functions. . . .	M
Defines power functions.	M
Evaluates the number two raised to real numbered powers	Ap

ADVANCED MATH FUNCTIONS (cont.)	Level of Ach.
Evaluates the number three raised to real numbered powers.	Ap
Expresses numbers as powers of 2 .	Ap
Recongizes and interprets the graph of $f(x) = 2^x$	Ap
Defines the constant "e"	M
Recognizes and interprets the graph of $f(x) = e^x$	Ap
Defines the derived function of e^x.	M
Defines an inverse function. . . .	M
Defines a function which is one-to-one.	M
Defines a strictly increasing function	Ap
Defines a logarithmic function . .	M
Computes common logarithms	M
Computes mathematical expressions using the basic logarithm theorems	Ap
Recognizes and interprets the graph of $f(x) = \log_e x$	Ap
Computes logs of numbers to the base of "e".	Ap
Converts logs with a given base to logs with a different base	Ap
Knows and uses the theorem: "If $y = f(x)$ is increasing (or decreasing) and has a derived function at every point of this interval and $f'(x) \neq 0$ in this interval, than the inverse function $x = g(y)$ has a derived function in the corresponding interval and $g'(y) = \frac{1}{f'(x)}$"	K
Knows and uses the theorem: "If $f(x) = \ln x$, then $f'(x) = \frac{1}{x}$ . . .	Ap

ADVANCED MATH FUNCTIONS (cont.)	Level of Ach.

MATRIX ALGEBRA

Defines a matrix.	M
Adds matrices	M
Multiplies a scalar times a matrix.	M
Defines the order of a square matrix.	M
Defines the zero matirx	M
Subtracts matrices.	M
Multiplies matrices	M
Defines the multiplicative identity element for matrices of order 2.	M
Names vectors in matrix form. . . .	M
Defines the determinant of a matrix.	M
Evaluates the determinant of a matrix.	M

APPLICATION PROBLEMS

Solves problems involving maximum and minimum values.	Ap
Solves compound interest problems (using exponential functions) . . .	Ap
Solves problems involving continuous compounding (using exponential functions).	Ap
Solves problems of population growth using exponential functions.	Ap
Computes average velocity	Ap

ADVANCED MATH APPLICATION PROBLEMS (cont.)	Level of Ach.	ADVANCED MATH APPLICATION PROBLEMS (cont.)	Level of Ach.
Computes instantaneous velocity. .	Ap		
Computes the acceleration of a body	Ap		
Computes the area under a curve. .	Aw		

PERSONAL BUSINESS MATH BASIC OPERATIONS	Level of Ach.
Adds whole numbers.	R
Subtracts whole numbers	R
Multiplies whole numbers.	R
multiplies by multiples of 10, 100, and 1,000	R
uses short cuts for multiplication (by 25, 50, 11) . .	M
Divides whole numbers	R
divides by multiples of 10, 100, and 1,000.	R
uses short division	M
uses divisibilty rules for 2, 3, 4, 5, 9	M
Rounds off numbers (whole numbers and decimals)	R

PERSONAL BUSINESS MATH FRACTIONS (cont.)	Level of Ach.
Percents (cont.)	
percent percentage % rate base	
Converts decimals to percents. . . .	M
Converts percents to decimals. . . .	M
Converts fractions to decimals to percents	M
Converts percents to decimals to fractions.	M
Uses formula for finding percentage. rate(percent) times base equals percentage. R x B = P	M
finds percentage	M
finds percent (rate)	M
finds base	M
Uses proportion in percentage. . . .	M

FRACTIONS	
Adds fractions.	R
Subtracts fractions	R
Multiplies fractions.	R
Divides fractions	R
Uses aliquot parts in multiplication (i.e. 30 lbs. at 33 1/3¢ per lb. = 30 x 1/3) 33 1/3¢ = 1/3 of a $1.	M
Decimals	
Adds decimals	R
Subtracts decimals.	R
Multiplies decimals	R
Divides decimals.	R
Percents	
Recognizes terms and symbols. . .	M

CONSUMER GOODS AND SERVICES	
Demonstrates a knowledge of the types of credit available and an understanding of the cost of each (i.e. charge accounts, charge cards, installment buying, etc.).	Ap
Demonstrates a knowledge of the requirements for establishing and maintaining a good credit rating . .	Ap
Demonstrates a knowledge of various types of purchasing agreements such as cash payments and deferred payment plans.	Ap
Computes discounts and discount rates.	Ap
Demonstrates the ability to make change	M
Demonstrates the ability to read and interpret sales receipts	M

PERSONAL BUSINESS MATH CONSUMER GOODS AND SERVICES	Level of Ach.
Describes the advantages and disadvantages of various types of stores and businesses (i.e. department stores, supermarkets, discount stores, retail stores, wholesale outlets, cooperatives).	Ap
Uses pertinent information as a basis for evaluating and obtaining estimates on services and products of various types.	Ap
Demonstrates the ability to compare quality and price of various products.	Ap
TAXES	
Calculates sales tax on taxable items	M
Demonstrates a knowledge of and ability to compute income taxes, (i.e. federal, state, and local).	Ap
Demonstrates a knowledge of existing per capita taxes	K
Demonstrates a knowledge of existing occupational priviledge taxes	K
Demonstrates the ability to compute real estate taxes	Ap
MEASUREMENT (GEOMETRY)	
Demonstrates a knowledge of tables	
reads	Ap
interprets.	Ap

PERSONAL BUSINESS MATH MEASUREMENT (GEOMETRY) (cont.)	Level of Ach.
INSURANCE	
Demonstrates a knowledge of insurance	
school insurance plans.	Ap
life.	Ap
homeowners (fire, liability, theft, etc.).	Ap
medical	K
automobile (motorcycle, etc.) .	Ap
mortgage.	K
renters insurance	K
unemployment.	K
disability.	K
income protection plans	K
travel.	K
PERSONAL INCOME	
Calculates job income	
hourly.	Ap
piece-rate.	Ap
commission.	Ap
bonuses	Ap
Calculates payroll deductions (social security, fed. inc. tax, state inc. tax, wage tax, retirement, medical plan, etc.)	Ap
Reads payroll stubs	M
Writes a budget with long and short range planning.	Ap

PERSONAL BUSINESS MATH BANKING AND FINANCING	Level of Ach.
Banking Services	
Uses a checking account. . . .	M
Balances a checkbook . . .	M
Writes checks.	M
Completes deposit slips. .	M
Understands the regulations governing checking accounts	M
Uses a savings account	
calculates interest	
simple interest. . . .	Ap
compound interest. . .	Ap
fills out deposit and withdrawal slips	M
Understands the rules governing safety deposit boxes	Ap
Demonstrates a knowledge of trust funds.	K
Demonstrates a knowledge of the special accounts offered by banking institutions (Christmas clubs, vacation clubs, etc.)	K
Uses checks	
demonstrates a knowledge of different kinds of checks	
certified	Ap
payroll	Ap
travelers	Ap
personal.	Ap
money orders.	Ap
understands the procedure for cashing different kinds of checks.	Ap
Financing Services	
Demonstrates a knowledge of bank loans	Ap
Demonstrates a knowledge of other loan agencies.	Ap
Demonstrates a knowledge of credit unions.	Ap

PERSONAL BUSINESS MATH INVESTMENTS	Level of Ach.
Demonstrates a knowledge of banks. . .	Ap
knows the different types of bonds	
calculates interest	
Demonstrates a knowledge of stocks . .	K
knows the different types of stocks	
reads stock market report	
calculates dividends	
Demonstrates a knowledge of annuities.	K
Demonstrates a knowledge of mutual funds.	K
Demonstrates a knowledge of savings certificates	K

BUSINESS MATH BASIC OPERATIONS	Level of Ach.
Adds whole numbers.	R
Subtracts whole numbers	R
Multiplies whole numbers.	R
multiplies by multiples of 10, 100, and 1,000.	R
uses short cuts for multiplication (by 25, 50, 11) . .	M
Divides whole numbers	R
divides by multiples of 10, 100, and 1,000.	R
uses short division	M
uses divisibility rules for 2, 3, 4, 5, 9	R
Rounds off numbers (whole numbers and decimals)	R

BUSINESS MATH FRACTIONS (cont.)	Level of Ach.
Percents (cont.)	
percent.	M
percentage	M
%	M
rate	M
base	M
Converts decimals to percents.	M
Converts percents to decimals.	M
Converts fractions to decimals to percents	M
Converts percents to decimals to fractions.	M
Uses formula for finding percentage. . rate(percent) times base equals percentage. R x B = P	M
finds percentage	M
finds percent (rate)	M
finds base	M
Uses proportion in percentage.	M

FRACTIONS	
Adds fractions.	R
Subtracts fractions	R
Multiplies fractions.	R
Divides fractions	R
Uses aliquot parts in multiplication (i.e. 30 lbs. at 33 1/3¢ a lb. = 30 x 1/3)	M
Decimals	
Adds decimals	R
Subtracts decimals.	R
Multiplies decimals	R
Divides decimals.	R
Percents	
Recognizes terms and symbols	

CONSUMER GOODS AND SERVICES	
Demonstrates an awareness of the types of credit available and an understanding of the cost of each (i.e. charge accounts, installment buying, charge cards, bank cards, etc.). . . .	Ap
Computes finance charges when using credit cards	Ap
Demonstrates a knowledge of the requirements for establishing and maintaining a good credit rating . . .	Ap
Demonstrates awareness of various types of purchasing agreements such as cash payment and deferred payment plans.	Ap
Demonstrates an ability to price goods to sell at a profit	
computes gross profit and net profit	Ap

BUSINESS MATH CONSUMER GOODS AND SERVICES (cont.)	Level of Ach.
computes rate of gross profit (markup) and rate of net profit.	Ap
computes the selling price . .	Ap
computes the cost.	Ap
Computes discount, sale price, and discount rates	Ap
Demonstrates the ability to make change.	Ap
Demonstrates the ability to read and interpret sales receipts.	Ap
Describes the advantages and disadvantages of various types of stores and businesses (i.e. department stores, supermarkets, discount stores, retail stores, wholesale outlets, cooperatives) .	Ap
Demonstrates the ability to compare quality and price of various products	Ap
TAXES	
Calculates sales tax on taxable items.	M
Demonstrates an ability to complete a federal income tax form.	Ap
long form short form reads tax tables	
Demonstrates a knowledge of and the ability to compute state and local income tax	Ap
Demonstrates a knowledge of existing per capita taxes.	K
Demonstrates a knowledge of existing occupational privilege taxes.	K
Demonstrates the ability to compute real estate taxes.	K
Demonstrates a knowledge of gasoline taxes	K

BUSINESS MATH TAXES (cont.)	Level of Ach.
MEASUREMENT (GEOMETRY)	
Demonstrates a knowledge of graphs (circle, bar, line).	M
reads interprets constructs	
Demonstrates a knowledge of tables.	M
reads interprets	
Demonstrates a knowledge of maps. . .	M
reads interprets	
Demonstrates an understanding of the metric system of measurement. . .	M
INSURANCE	
Demonstrates a knowledge of insurance	
school insurance plans.	M
life.	Ap
homeowners (fire, liability, theft).	K
medical	K
automobile (motorcycle, etc.) . .	Ap
mortgage.	K
renters insurance	K
unemployment.	K
disability.	Aw
income protection plans	Aw
travel.	Aw

BUSINESS MATH PERSONAL INCOME	Level of Ach.
Calculates job income	
hourly.	M
piece-rate.	Ap
commission.	Ap
bonuses	K
Calculates payroll deductions (social security, federal income tax, state income tax, wage tax, retirement, madical plan, etc.) .	Ap
Reads and understands a time card	Ap
Reads, understands and completes a payroll stub.	Ap
Writes a budget with long and short range planning.	Ap

BANKING AND FINANCING	
Bank Services	
Uses a checking account . . .	M
Balances a checkbook	
Writes checks	
Completes deposit slips	
Uses a savings account. . . .	M
Completes deposit slips	
Completes withdrawal slips	
Calculates interest	
6%, 60 day method	
compound interest	
Understands a bank statement.	M
Uses checks	
Demonstrates a knowledge of different kinds of checks	
certified.	Ap
payroll.	Ap
travelers.	Ap
personal	Ap
money orders	Ap
Understands the procedure for cashing different kinds of checks	M

BUSINESS MATH BANKING AND FINANCING (cont.)	Level of Ach.
Financing Services	
Demonstrates a knowledge of bank loans.	K
Demonstrates a knowledge of other loan agencies	K
Demonstrates a knowledge of credit unions	K

INVESTMENTS	
Demonstrates a knowledge of bonds . .	Ap
knows the different types of bonds	
calculates interest	
Demonstrates a knowledge of stocks. .	K
knows the different types of stocks	
reads stock market report	
calculates dividends	
Demonstrates a knowledge of annuities	K
Demonstrates a knowledge of mutual funds	K
Demonstrates a knowledge of savings certificates.	K